Space Weather Forecast

Issued on Monday, 16 January 2023 at 01:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Further Minor/Moderate Radio Blackouts (R1/R2) expected throughout. Risk Minor Geomagnetic Storm G1 rising from midweek.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with two Moderate-class flares observed. The largest of these events was from an emerging region on the northeast limb. The other was observed emanating from a region in the southeast.

The solar disc remains highly congested in terms of sunspot regions, particularly the eastern solar horizon, with 10 sunspots at present.

Two coronal mass ejections were analysed, one of which has been indicated to possibly be Earth directed, with an estimated arrival at Earth at the very end the UTC day of Wednesday 18 January, with effects ongoing into Thursday.

Solar Wind / Geomagnetic Activity: The solar wind showed a slight decreasing trend from Elevated to Slightly Elevated speeds by 15/1800 UTC with an increasing trend back to Elevated by the end of the period, likely due to waning coronal hole effects initially, then with coronal mass ejection effects by the end of the UTC day. The Interplanetary Magnetic Field followed a moderate but flat and predominantly negative trend initially, then became weak and mostly positive from15/2300 UTC. The Bz reached -10nT. The net result of the above solar wind measures was a mostly Active spell (Kp4), bookended by G1/Minor Storm intervals (Kp5).

Energetic Particles / Solar Radiation: No solar proton storms were observed through the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is Expected to be Moderate, with a daily Slight Chance of X-class flares. Although one of the more active regions departs the front side by midweek UTC, the sheer weight of current and expected eastern solar hemisphere arrivals should serve to compensate.

Solar Wind / Geomagnetic Activity: Solar wind speeds are expected to ease through day 1 (16th) due to fading coronal hole and coronal mass ejection effects. A largely Quiet environment succeeds this. Day 3 (18th) may see wind speeds rise to Elevated due to the faint coronal hole 65 arrival. There is then the risk of a coronal mass ejection from a double moderate-class flare which left the Sun on 14th, arriving later day 3 or day 4 (18th or 19th).

There is an initial Slight Chance of further G1 intervals on day one before a lull, rising to a Chance on 18th or 19th to combined coronal hole and coronal mass ejection arrivals.

Energetic Particles / Solar Radiation: The chances of solar radiation storms are likely to remain at predominantly background levels, but with a Slight Chance of enhancements which could produce an S1 or greater event through the period due to the number of magnetically complex sunspot regions.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	30	40
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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